

THE DANGERS FROM STRAY ELECTRICITY IN THE GROUND

Poorly maintained power distribution systems that cannot cope with 21st century demands are believed to cause ground leakages of electrical current, with detrimental effects on animals and people.

by Chris Hardie

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ELECTRICITY'S DIRTY LITTLE SECRET

ATHENS, Wisconsin, USA — James Gumz fell silent as his eyes dropped to his calloused, clenched hands. Outside in the cold fall night, the day's final chore waited: the evening milking. The chore hadn't been the same since the winter four years ago, when 20 dead cattle were dragged from the barn. The surviving cows limped on crippled legs, with open sores on their body that would not heal.

One day, Gumz ran from the barn screaming because he couldn't take it anymore.

"When it first started, we blamed ourselves," Gumz said, lifting his face to display a grease-smearred cheek. "I went through depression and had to see a psychiatrist. I'd come home and just shake and cry. You just can't stand it."

On the kitchen wall of the modern farmhouse is a wooden plaque with the words, "House protected by guardian angels". But there is no protection from what James and Grace Gumz say is an invisible but powerful force that has devastated their dairy herd.

The Gumzes are not alone. Across Wisconsin and in other states, hundreds of dairy farmers struggle with "stray voltage"—electrical current flowing through the earth. Scientific research suggests that stray voltage has extreme physiological effects on cows and other animals when it reaches certain levels.

In the Coulee region, the stray voltage issue boiled over last week [the week of 30 January 2000], when more than 30 farmers presented a list of 13 demands to the Riverland Energy Cooperative board of directors in Arcadia. Those demands included the resignation of David Oelkers, cooperative general manager, "unless he agrees to represent the interests of the cooperative and its members".

QUESTIONS OVER HEALTH AND POWER QUALITY

But the controversy over stray voltage is not confined to dairy farms. There are increasing concerns in industry, business and the scientific community that the more than 2.5 million miles [4.02 million km] of power lines that bring us heat, jobs, safety and light have a potential dark side. Some are concerned our increasing appetite for power and technology strains the ageing power lines. They worry that in a growing number of locations in the Coulee region, electrical current is showing up in streams, on pipelines, in buildings, in barns and in homes.

While La Crosse area electrical utilities say their systems are both adequate and safe, there is contention about how much electricity normally carried on power-line neutral wires is actually flowing into the earth.

There also is concern about what effect that current has on animals and humans.

Farmers say their cows are crippled and gaunt, with flesh burns and open sores that don't heal. Some cows go blind. Others abort their calves and some simply break down—lying down and never getting up. Those that don't die immediately are sold for slaughter through rendering plants.

"I should be thrown into jail for treating the cows the way they look, but it's not my fault," Gumz said.

Farmers also worry that stray voltage is harming them. "Common sense will tell you that if it happens to a 1,200-pound cow, what's it doing to a human being?" said Richard Asher of Independence.

The effects on both animal and human health are wrapped in a coil of controversy, but power quality is not. Power quality "will get worse before we'll be able to mitigate it,"

said Marek Samotyj, Electric Power Research Institute manager for power quality, in a July 1999 edition of *Fortune* magazine.

Power quality also is a focus of a newly organised state group. The Rural Energy Management Council is an 18-member board that will look at stray voltage and other energy-related issues facing rural Wisconsin.

WHY IS POWER QUALITY GETTING WORSE?

"We have a 19th century distribution system and 21st century technology," said Dave Stetzer, an electrical contractor from Blair, Wisconsin. Stetzer is leading a charge against the utility industry, whom he blames for misleading farmers and the public about the problem of electrical pollution and ignoring potential solutions. "It's a very simple thing. We're using the earth as a conductor rather than for safety."

The Electric Power Research Institute says 70 per cent of all electricity used by 2002 will pass through equipment that produces wavelength distortion—called harmonics—that puts heavy loads on the electrical system, up from 30 per cent in 1999. A higher estimate comes from the electrical industry magazine *Power Quality Assurance*, which says 60 per cent of the electrical load already causes harmonics.

Duane Dahlberg, a retired physicist who is now a consultant for The Electromagnetics Research Foundation in Moorhead, Minnesota, has studied ground currents and stray voltage since 1983.

"The ground currents have increased mainly because of the lack of repair on the lines and because of the fact they have increased the loads on the lines without improving them," Dahlberg said. "Higher loads force a greater current to go through the ground rather than the neutral."

Both Northern States Power Co. and Riverland Energy Cooperative say they have a constant improvement plan to upgrade and repair power lines. Oelkers said Riverland also has a contingency fund to deal with emergency repairs.

Mike Herro, an NSP spokesman, said the utility has not seen evidence of increased ground currents and said harmonics are under control.

"I've seen most of the concern in places where they have a lot of switching power supplies like an industrial plant or a business that has lots of computers," Herro said.

And Oelkers said harmonics are more of a concern in more industrialised areas.

A 1995 survey by the Minnesota Public Utilities Commission of 48 utilities found that 59 per cent of the conventional electrical current flowed into the earth. The study did not measure harmonics, however, and concluded that earth currents were not a significant factor in stray voltage.

But the utilities picture nationwide is not as optimistic when it comes to power quality issues. "Electrical utilities are unanimous," *Power Quality Assurance* said in a recent article. "The epidemic has barely begun."

"STRAY VOLTAGE" ON THE FARM

It is a bright, late fall day as a dozen or so farmers gather in front of a newer concrete block barn on the farm of Duane and Renée Suchla outside of Arcadia. Pigeons coo in the rafters and a thin coat of dust from ground corn covers the dirt.

There is idle talk of mild weather, but the congregation has come together to hear about stray voltage. Giving the sermon is Dave Stetzer, who stands in front of the barn with his hands draped over a decorative concrete block pulpit. Standing nearby is Chuck Forster, an electrical engineer and stray voltage consultant for the state's electrical cooperatives, and other Riverland Energy Cooperative employees.

Many of the farmers, like the Suchlas and their neighbour Steve

Haines, have heard Stetzer's message before. They and many other farmers have hired him to diagnose the cause of electrical problems on their farms. They show no surprise when Stetzer immediately attacks.

"I can plainly see this problem isn't going away," said Stetzer, who claims he and his partner Martin Graham—a retired professor of electrical engineering and computer sciences at the University of California, Berkeley—have invested \$4.5 million into research. "I don't mince words. That's the way I am. I'm going to call them paid utility whores because that's what they are"—referring to scientists conducting stray voltage research that is funded in part by utility companies. "I could have sold you the Brooklyn Bridge and it wouldn't do any good. Nothing I can sell to you can fix your problem. It's a utility problem."

The utilities say it's not always their problem. "Most problems are caused by on-farm sources," Herro said. "There are ways to solve on-farm sources. Every single farm has stray voltage. You can either attack by decreasing the amount of ground current generated from the farm sources or the utility sources. And there are documented ways to do both."

But Haines, who milks a 45-cow registered Brown Swiss herd about three miles from the Suchla farm, says he still has his stray voltage problem despite working with his utility.

"I've been dealing with [stray voltage] for many years and no one wanted to do anything about it until Dave Stetzer came around," he said.

He also said that since taking over the family farm in 1970, he has rewired his farm, put in an electrical grounding system and still he has problems with electrical currents flowing through his barn, despite numerous visits by Riverland (formerly Trempealeau) Cooperative employees.

"Stetzer's going to set the record straight," Haines said. "We'll share some opinions and see what side [the cooperative] is on. Someone's going to be called a liar; that's what I think."

Duane Suchla says he doesn't think he has got the truth since he built the barn and expanded his herd from 100 to 300 cows in December 1993. He saw problems with his cows almost immediately. Milk production fell and the cows refused to drink, had trouble getting up and were aborting calves at the rate of 20 per

"... ground currents have increased mainly because of the lack of repair on the lines and because of the fact they have increased the loads on the lines without improving them ..."

cent. Those are typical symptoms of cows being affected by electrical current, or stray voltage, as detailed in numerous stray voltage studies.

The cooperative was notified almost right away, Suchla said. "And they've been out here many times, but never follow up on it."

Oelkers said the co-op has done and will continue to do everything it can to help Suchla, including making an offer to do a complete on-farm assessment with the help of the Public Service Commission. He said Suchla turned down the offer.

Renée Suchla said she and her husband turned it down because they requested an assessment from a group independent from Riverland.

Oelkers said the cooperative has installed some new wires to serve the farm and responds according to Public Service Commission guidelines on stray voltage.

Suchla claims he has spent US\$40,000 installing new three-phase wiring, a "ring of life" system where his farm is surrounded by ground rods in an attempt to divert earth current, and an isolation transformer. The isolation transformer is designed to keep farms from being affected by current coming from off-farm sources by isolating the farm electrical system from the distribution line.

But Suchla said milk production continues to decline, despite efforts to improve feeding and nutrition. "I've been milking cows 23 years. In 1978, I had an 18,000- to 19,000-pound herd average. Now it's down to 10,000 to 11,000."

Suchla said he has replaced 200 cattle in the past year. Of the 64 he bought last summer, only half are alive. "I hauled over 50 dead cows out, sometimes three or four a day," he said.

With milk prices at record lows and cows dying with no answers, Suchla says: "I just want to fix the problem, whatever it is. We just want the problem solved."

Oelkers said the cooperative is sensitive to Suchla and other farmers who have stray voltage problems. But he said some of the electrical measurements found by Stetzer are not part of what the state recognises in its stray voltage protocol, which he says ties the hands of the utility by limiting the scope of what it can investigate.

"It begs the question," Oelkers said of Suchla's farm problems. "Is it something different than electrical?"

DETECTIVE WORK

Stetzer said he had no intention of becoming involved with stray voltage when a customer contacted him in December 1997. "You can have stray dogs or stray cats, but you can't have stray voltage. It's got to come from somewhere."

Stetzer, who was trained as an electrician in the air force, said he took an oscilloscope to the farm to check it out. An oscilloscope measures voltage variations and displays the waveform of the current.

"I left the scope there over the weekend and went back Sunday morning because I didn't want to spend valuable time chasing ghosts," Stetzer said.

What his scope recorded was a series of voltage spikes flowing through the barn floor. By the signatures of the spikes, Stetzer said he could track them to off-farm sources, including times when a nearby farm was using electrical motors.

"I figured that would be the end of it," Stetzer said. "I'd call the utility and they'd come out and fix it."

Instead, Stetzer said utility officials questioned him. He said they denied that the source could be coming through their distribution line from another farm.

"I said I don't care what you want to tell the farmer, but don't lie to me," Stetzer said. "I'm not going to get involved in this. This was my first and only case."

But Stetzer became involved when he asked the farmer's milkman if he knew any other farmers with stray voltage. He was directed to the farm of David Quarne near Blair.

"I went out there and checked and within 20 minutes I knew what his problem was," Stetzer said. "It was an off-farm utility problem."

Stetzer said he pinpointed the problem to what he calls an inadequate neutral wire on the power line between Blair and Taylor. On a power system, unused power returns to the substation on the neutral line to complete the circuit. Stetzer said the power line, built in 1936, is not big enough to handle today's electrical needs.

"It's like running four inches of water through a two-inch pipe," he said. "You have an overflow."

Herro refutes Stetzer's claim that the NSP line is faulty. "The Blair-Taylor line is more than adequate to meet their needs and even for substantial growth," Herro said. The line may date to 1936 but has been upgraded with new equipment as needed, he said.

Stetzer said he discovered more than current overflow. Based on his oscilloscope readings, he found that the current flowing through Quarne's farm and other nearby farms was not regular alternating current (AC), which flows at 60 times a second or 60 hertz. He says he saw frequency similar to that of microwaves.

All wavelengths fall on the electromagnetic spectrum, where they are measured by their frequency. Power frequency fields fall on the low end of the spectrum. On the upper end of the spectrum are ultraviolet and X-rays, which have shorter wavelengths but higher frequencies.

Stetzer said that when he measured the frequency of the current flowing into the farms, he found readings near the middle of the



spectrum, close to microwaves. Microwaves are thermal and cause heating, hence the microwave oven.

Utilities investigating stray voltage reports do not test for high frequencies, both Oelkers and Herro said. Public Service Commission guidelines established in 1989 said testing should be done only on the 60-hertz cycle.

While in the air force, Stetzer saw frequency burns on humans from exposure to certain radiowaves. He said he saw similar burns on some of the cows on farms with stray voltage problems.

"Every farm that I went to that had these high levels; the cows had these sores where they came in contact with the concrete," Stetzer said. He had a biopsy performed on one of the sores and found extensive tissue damage. "The tissue underneath was dead. It looked grey, just like the roast you would take out of the oven. But right underneath that it was okay. So there was more damage done on the inside than the outside."

Microwaves cook food from the inside out.

A PATTERN OF SYMPTOMS

If these currents are burning cows, what effect do they have on humans? That depends on whom you ask. There have been hundreds of studies on the effects of electromagnetic forces on humans, with mixed results.

But according to a 1989 study by the US Office of Technology Assessment, titled "Biological Effects of Power Frequency Electric and Magnetic Fields", there are risks.

"As recently as a few years ago, scientists were making categorical statements that on the basis of all available evidence there are no health risks from human exposure to power-frequency fields," the report said. "In our view, the emerging evidence no longer allows one to categorically assert that there are no risks. But it does not provide a basis for asserting that there is significant risk."

The government conducted another study, through the National Institute of Environmental Health Sciences, released last year. That six-year study concluded that evidence for a risk of cancer and other human diseases from electric and magnetic fields around power lines is weak.

A thesis review of peer-reviewed papers and reports by Neil Cherry, a New Zealand researcher, shows brain function change, sleep disruption, chronic fatigue, immune system impairment and cancers associated with above-average exposure to radiofrequency and microwave exposure.

Stetzer admits he is no doctor. "I know electricity," he said. But after testing hundreds of farms, he has found a pattern of symptoms among farmers and home owners similar to those disclosed by Cherry and found in other research into radiofrequency and microwave exposure.

Stetzer said those symptoms include fatigue, muscle stiffness, sleeplessness, anxiety, depression, joint pain, skin irritations, heart palpitations and others.

David Jenkins, Wisconsin Federation of Cooperatives manager, said there is no evidence that harmonics and earth currents described by Stetzer and his partner cause cancer or the other ailments detailed by the men.

"We're concerned about those allegations and would like information to substantiate that," Jenkins said. "We have asked Dr Henry Anderson, the state's chief medical officer of environmental health, to please look into this. He's told me the state has no evidence to substantiate it... So we're very conscientiously trying to find comparable or peer-reviewed research."

Stetzer, who wants his medical information reviewed by an epidemiologist, wonders whether the diseases of the 1990s like fibromyalgia and chronic fatigue syndrome could be related to a chemical change from electricity.

One person who agrees with Stetzer is Jim Beal, a former NASA engineer specialising in wavelength technologies. Beal also did research with the Miami Heart Institute and Parkinson Foundation and said he has collected information on electromagnetic and microwave frequencies since 1960.

Beal said there is more research going on to look at the effects of microwave and cellular phones on humans, but since the results are long term it doesn't get much attention.

"This is one of the many consequences of technology," said Beal, who believes that the fatigue and stress affects 80 per cent women and 20 per cent men. "It's interesting how we kind of ignore these things. But there aren't enough human bodies dropping now. The cows and bird migration and the environment may help attract more attention. We need research, in-depth, with the people who are electronically sensitive, mainly women. Doctors aren't paying attention to them."

John Beyerl, who has battled stray voltage on his rural Colby farm for seven years, believes there is a connection between ground currents and his health.

"You go to bed feeling like you're going to get the flu," Beyerl said. "You have the symptoms but you never get it."

Beyerl has a rash that does not heal, which is scabbed over from his constant scratching.

"It's bad today," Beyerl said one day in late October. He said his pelvis and chest hurt and often he has heartburn, a

headache and aching joints. Extreme symptoms usually correspond to peaks in current that a computer records in his barn.

Sixty-two-years-old Leroy Asher of Independence has had many cows die on his farm and has had several electrical engineers there to try to fix the problem. He gave up last year and sold his cows. But he says he lost it all when his wife died after a series of ailments.

An emotional Asher spoke up about his troubles during a Riverland Cooperative board meeting last week [w/c 30 January 2000].

"I lost nine cows in the last three months," he said. "My wife died in our house four years ago. If you look at Stetzer's readings, you'd know what I live with. I wished you people would start doing something about it and quit lying to us."

PUTTING IT ALL ON THE LINE

Stetzer, a fast-food hamburger in one hand and the steering wheel of his pickup truck in the other, points to the grey, weather-

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worn power poles on the way to the Beyerl farm. He says he never paid much attention to them until he became involved in the stray voltage issue.

"Now I look at them all the time," he said.

Stetzer knows that his confrontational style and the letters he has written to state officials have made him an outcast to some.

Along with putting his reputation and 21-employee business on the line, he claims he has poured \$2.5 million of his own money—along with \$2 million from his partner Graham—in research that includes computer monitoring of more than 6,000 cows in several states. This money he says he will never recoup because he's got "nothing to sell".

"If I charged the Beyerls my normal rate of \$150 an hour, they'd owe me \$500,000," Stetzer said. "This isn't about money. I spend 21 hours a day on this. The three hours I'm supposed to be sleeping I keep a pencil and paper next to my bed. Yes, it's consumed me. It's obsessed me. I could lose everything."

INCOMPETENCE OR A COVER-UP?

Just a few minutes after her husband James leaves to milk the cows, Grace Gumz arrives home from her job. She quickly tidies the kitchen and puts on a frozen pizza in the pizza oven that was an anniversary gift from James. There's just enough time for a quick meal before she needs to leave again to teach her son's religious studies class at church.

Gumz has asked her pediatrician for medical information about the possible effects of high-frequency current on her three children. "All of the utilities say there is no documentation and my pediatrician gave me at least a one-half-inch-thick packet of documentation," Gumz said. "Either they're doing a real bad job or it's all a cover-up."

She wipes the table with a dishcloth and puts down some dinner plates. "I shouldn't be tired in my own home. My husband shouldn't have to come home walking like a 60-year-old man. He shouldn't wake up crying because he's in so much pain. What's this doing to my kids? I want to be taken care of. I just get so angry..."

Gumz pauses, her voice choking and eyes watering. "It's just so pathetic."

Reaching for a stack of papers and documents, Gumz shows pictures of humped-up cows and others with open sores that began to show up on the herd in 1997. "This stuff is real, it's there."

The pizza is finished. She calls to her son to get ready.

"You know, most of us are happy to be living in the country and to be called farmers," she said. "It's gotten to the point that we're called stupid..."

Gumz stops and blinks back the tears. She walks past the guardian angel plaque and leaves for church.

Editor's Note:

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For further information, news updates and links on stray voltage, visit the website www.strayvoltage.org, set up by the *La Crosse Tribune* and funded in part by the Pew Center, an organisation devoted to civic journalism projects; also see the website www.toxicelectricity.com.